What is claimed is:

1. A system to provide breathing gas to a user by decomposing nitrous oxide to a breathable mixture of oxygen and nitrogen, said system comprising the following components:

(a) a first storage tank adapted for storing liquid nitrous oxide;

(b) a first throttling device in line with said tank, said throttling device adapted for feeding vaporized N_2O in a controlled manner;

(c) a thermal reactor in line with said throttling device, said reactor capable of creating a self sustaining decomposition of the vaporized N_2O to a mixture of breathable gas of approximately one-third oxygen and two thirds nitrogen;

(d) a second throttling device receiving said breathable gas mixture, said second device feeding the breathable gas mixture in a regulated manner to the user of said system.

2. The system of claim 1 wherein said reactor utilizes a catalyst to decompose the N_2O.

3. The system of claim 2 wherein said catalyst is a metal oxide on a catalyst support selected from the group consisting of alumina, magnesia and mixtures thereof.

4. The system of claim 2 wherein said catalyst is selected from the group consisting of cobalt, palladium, copper and mixtures thereof, ion-exchanged with a zeolite selected from the BETA type zeolite group.

5. The system of claim 2 wherein said catalyst is selected from the group consisting of palladium oxide, iridium oxide, osmium oxide, platinum oxide, vanadium oxide, iron oxide, chromium oxide, titanium oxide, nickel

oxide, manganese oxide, lanthanum oxide, samarium oxide cerium oxide, praseodymium oxide, neodymium oxide, europium oxide, terbium oxide, gadolinium oxide, thulium oxide, lutetium oxide, ytterbium oxide, erbium oxide, dysprosium oxide, holmium oxide, aluminum oxide, gallium oxide, indium oxide, thallium oxide, scandium oxide, yttrium oxide, beryllium oxide, magnesium oxide, calcium oxide, strontium oxide and barium oxide, on a support selected from the group consisting of alumina, magnesia, zirconia, yttria, calcium oxide, strontium oxide and gallium oxide.

6. The system of claim 2 wherein said catalyst is selected from the group consisting of iron, palladium, platinum, iridium and osmium, ion-exchanged with BETA base zeolite, MOR base zeolite, MFI base zeolite, MEL base zeolite, MER base zeolite and mixtures thereof.

7. The system of claim 2 wherein said catalyst operates at a temperature above about 150°C.

8. The system of claim 2 wherein said catalyst operates at a temperature in the range of about 250°C to 900°C.

9. The system of claim 1 wherein there is a second storage tank in line with said reactor, said second storage tank for storing a surge volume of the resultant breathable gas mixture.

10. The system of claim 9 further comprising a control system in communication with said reactor and said first throttling device for insuring sufficient flow to said reactor to sustain said reaction.

11. The system of claim 10 wherein said control system utilizes a pressure transducer to detect a pressure differential between said second storage tank and the gas flow pressure into said reactor.

12. The system of claim 1 wherein an additional membrane after the reactor is added to enrich the percentage of oxygen in the breathable gas mixture.

13. The system of claim 1 wherein said system is small enough to fit on the back of a human being.

14. The system of claim 1 wherein the heat generated by the decomposition of nitrous oxide is provided to a suit worn by said user which provides warmth to a wearer of said system.

15. The system of claim 2 wherein an electronic ignition heats the catalyst bed to a temperature above 150°C prior to N_2O decomposition.

16. The system of claim 1 wherein the effluent gas from said reactor is passed adjacent said inlet gas such that there is heat transfer from said effluent gas to said inlet gas.

17. The system of claim 12 wherein said membrane results in an oxygen level about 70 mole percent.

18. The system of claim 12 wherein there are a plurality of membranes in a series thereby achieving an oxygen level of in excess of 90 mole percent.

19. The system of claim 12 wherein the membrane is used in combination with a recirculating pump to increase the mole percent of oxygen.

20. The system of claim 2 wherein said reactor comprises a container wherein the nitrous oxide gas is introduced into a single capillary which passes through a central region of said container in a longitudinal direction and wherein an exit of said capillary directs the nitrous oxide through a catalyst

filled annular region around said capillary, and wherein an exit of said annular region passes around said entrance of said capillary.

21. The system of claim 1 wherein said first storage tank is approximately 10 to 30 cm. in diameter and 20 to 100 cm. in length.

22. The system of claim 9 wherein said second storage tank is designed to hold approximately 1-10 liters of breathable gas at approximately 1 to 40 bar pressure.

23. The system of claim 1 wherein said throttling device is selected from the group consisting of a valve, pump, expander, orifice, regulator, or combinations thereof.

24 A portable system to provide breathing gas to a user by decomposing nitrous oxide to a breathable mixture of oxygen and nitrogen, said system comprising the following components:

(a) a first storage tank adapted for storing liquid nitrous oxide;

(b) a first throttling device in line with said tank, said valve adapted for feeding vaporized N_2O in a controlled manner;

(c) a thermal catalytic reactor in line with said valve, said catalytic reactor comprising a means for heating and a catalyst, said catalyst capable of creating a self sustaining decomposition of the vaporized N_2O to a mixture of approximately one-third oxygen and two thirds nitrogen; said catalyst selected from the group consisting of a noble metal or transition metal, on alumina, zirconia, yttria, or a substituted crystalline zeolite support, said catalyst operating at temperatures ranging from about 250°C to 900°C;

(d) a second storage tank in line with said reactor, said second storage tank for storing a small surge volume of the resultant breathable gas mixture in a pressure vessel;

(e) a second throttling device receiving said breathable gas mixture, said valve feeding the breathable gas mixture in a regulated manner to the user of said system; and

(f) a control system in communication with said retainer and said valve for insuring that minimum flow is maintained to sustain reactor temperature and which serves to increase flow to the reservoir when required.

25. A method for providing breathing gas in a system, said method comprising the following steps:

(a) storing liquid nitrous oxide in a first tank having an outlet;

(b) feeding nitrous oxide from the outlet of said tank in a controlled manner to a thermal reactor;

(c) heating said reactor to a temperature at which the decomposition of nitrous oxide will occur above about 150-250°C;

(d) sustaining a reaction in said reactor such that the decomposition of the nitrous oxide results in a breathable gas of approximately one-third oxygen and two-thirds nitrogen; and

(e) delivering the breathable gas mixture in a regulated manner to a user.

26. The method of claim 25 wherein said reactor utilizes a catalyst to decompose the N_2O.

27. The method of claim 26 wherein said catalyst is a metal oxide on a catalyst support selected from the group consisting of alumina or magnesia.

28. The method of claim 26 wherein said catalyst is selected from the group consisting of cobalt, palladium and copper or mixtures thereof, ion-exchanged with a zeolite selected from the BETA type zeolite group.

29. The method of claim 26 wherein said catalyst is selected from the group consisting of palladium oxide, iridium oxide, osmium oxide, platinum oxide, vanadium oxide, iron oxide, chromium oxide, titanium oxide, nickel oxide, manganese oxide, lanthanum oxide, samarium oxide cerium oxide, praseodymium oxide, neodymium oxide, europium oxide, terbium oxide, gadolinium oxide, thulium oxide, lutetium oxide, ytterbium oxide, erbium oxide, dysprosium oxide, holmium oxide, aluminum oxide, gallium oxide, indium oxide, thallium oxide, scandium oxide, yttrium oxide, beryllium oxide, magnesium oxide, calcium oxide, strontium oxide and barium oxide, on a support selected from the group consisting of alumina, magnesia, zirconia, yttria, calcium oxide, strontium oxide and gallium oxide.

30. The method of claim 26 wherein said catalyst is selected from the group consisting of iron, palladium, platinum, iridium and osmium, ion-exchanged with a BETA base zeolite, MOR base zeolite, MFI base zeolite, MEL base zeolite, MER base zeolite and mixtures thereof. .

31. The method of claim 26 wherein said catalyst operates at a temperature above about 150°C.

32. The method of claim 26 wherein said catalyst operates at a temperature in the range of about 250°C to 900°C.

33. The method of claim 25 wherein there is a second tank in line with said reactor, said second tank for storing a surge volume of the resultant breathable gas mixture.

34. The method of claim 25 further comprising a control system in communication with said reactor and said throttling device for insuring sufficient flow to said reactor to sustain said reaction.

35. The method of claim 34 wherein said control system utilizes a pressure transducer to detect a pressure differential between said second storage tank and the gas flow into said reactor.

36. The method of claim 25 wherein an additional membrane after the reactor is added to enrich the percentage of oxygen in the breathable gas mixture.

37. The method of claim 25 wherein said system is small enough to fit on the back of a human being.

38. The method of claim 25 wherein the heat generated by the decomposition of nitrous oxide is provided to a suit worn by said user which provides warmth to a wearer of said system.

39. The method of claim 25 wherein an electronic ignition heats the catalyst bed to a temperature above 150°C prior to N_2O decomposition.

40. The method of claim 25 wherein the effluent gas from said reactor is passed adjacent said inlet gas such that there is heat transfer from said effluent gas to said inlet gas.

41. The method of claim 36 wherein said membrane results in an oxygen level about 70 mole percent.

42. The method of claim 36 wherein there are a plurality of membranes in a series thereby achieving an oxygen level of in excess of 90 mole percent.

43. The method of claim 36 wherein the membrane is used in combination with a recirculating pump to increase the mole percent of oxygen.

44. The method of claim 26 wherein said reactor comprises a container wherein the nitrous oxide gas is introduced into a single capillary

which passes through a central region of said container in a longitudinal direction and wherein an exit of said capillary directs the nitrous oxide through a catalyst filled annular region around said capillary, and wherein an exit of said annular region passes around said entrance of said capillary.

45. The method of claim 25 wherein said first tank is approximately 10 to 30 cm. in diameter and 20 to 100 cm. in length.

46. The method of claim 33 wherein said second storage tank is designed to hold approximately 1-10 liters of breathable gas at approximately 1 to 40 bar pressure.

47. The method of claim 25 wherein said throttling device is selected from the group of a valve, pump, expander, orifice, regulator, or combinations thereof.